REMARKS

Claims 1-33 are pending. Claims 1, 2, 10, 14-16, 19, 22, 24, 26, and 28 are amended by way of this Amendment. All claims 1-33, as amended, are believed to be allowable over the references cited by the Examiner as discussed below. Accordingly, a Notice of Allowance for the present application is respectfully requested.

Rejection of Claims 1-3, 12-13 and 18 Under 35 U.S.C. §103

Claims 1-10, 13-15, 19-25, 27-29, and 33 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson in view of Andrea and Ruegg.

Each of independent claims 1, 19, 22, and 28, as amended, generally recites a system, headset, or method in which first and second microphones of an acoustic pick-up device receive acoustic signals from an acoustic source, a position estimation circuit produces an error signal from audio signals transduced by the first and second microphones, the error signal representing an estimate of the acoustic pick-up device having angular and/or distance mispositioning relative to the desired acoustic source that results in the acoustic signals received by the acoustic pick-up device *failing to achieve proper or adequate noise cancellation and resulting in the audio signals being degraded*, and a controller uses the error signal to compensate for the acoustic pick-up device being mis-positioned by providing the audio signals from the first and/or second microphones to an output.

Carlson discloses an apparatus for providing repeatable control of speech input to a microphone via audio feedback to a user. Specifically, Carlson compares averaged audio signal levels received by a single microphone with predetermined low and high thresholds to determine whether the microphone is too far or too close to the user's mouth and/or whether the user is speaking too loudly or too softly to thereby provide audio feedback to the user.

The Examiner contends that Carlson reads on a position estimation circuit coupled to receive the audio signals and the error signal representing an estimate of the acoustic pick-up device being positioned differently from intended with respect to the desired acoustic source.

However, as the Examiner noted, Carlson's apparatus utilizes only one input microphone. Thus, Carlson does not disclose nor suggest that the acoustic pick-up device has two microphones, nor that the position estimate circuit produces the error signal from audio signals *from two microphones* as an estimate of the acoustic pick-up device being mis-positioned. Because Carlson only utilizes one input microphone, Carlson also cannot produce an error signal representing an estimate of the acoustic pick-up device having angular and/or distance mispositioning relative to the desired acoustic source that results in the acoustic signals received by the acoustic pick-up device failing to achieve proper or adequate noise cancellation.

Carlson further fails to disclose or suggest that a controller uses the error signal to compensate for the acoustic pick-up device being mis-positioned by providing the audio signals from the first and/or second microphones to an output.

The Examiner relies on the secondary reference Andrea as disclosing the acoustic pick-up device as having first and second microphones at first and second distances from the acoustic source. However, Andrea discloses two input microphones for the purpose of noise cancellation. The goal of noise cancellation is to result in a high signal to noise ratio. As is well known in the art, the concept of noise cancellation inherently requires that the two input microphones receive differing levels of acoustic signals from the intended acoustic source (the desired acoustic signals). Moreover, the amount of that difference, for purposes of noise cancellation, should be sufficiently high in order for the noise to be cancelled out while preserving a relatively high level of the desire acoustic signal, so as to achieve maximum signal to noise ratio.

However, if the levels of acoustic signals from the intended acoustic source at the two microphones are the same or similar, then most, if not all, of the desired acoustic signals would be cancelled out, along with the noise, resulting in a low signal to noise ratio.

While Andrea may not explicitly require precise (or "correct") positioning of the two microphones, the goal of Andrea is noise cancellation. As such, Andrea not only does not teach but actually *teaches away from* any positioning of the microphones that fails to achieve proper or adequate noise cancellation, as generally recited in the claims as

amended. For example, Andrea states that "acoustic signals composed of speech or the like and background noise are supplied to the first microphone 12 .... The background noise is supplied to the second microphone 14 .... The op-amp 16 is adapted to subtract the noise signal from the second microphone 14 from the speech and noise signal from the first microphone 12 and to supply therefrom an electrical signal representing substantially the speech to the telephone unit 18 ...." (Col. 12, lines 55-66). In other words, the *basis* for Andrea's noise cancellation is that the first microphone is generally positioned toward the desired acoustic source and that the second microphone is generally positioned away from the desired acoustic source such that the second microphone receives lower levels of acoustic signals from the desired acoustic source and generally receives only the noise signals so as to cancel the noise that is also received by the first microphone.

Andrea also notes that the two microphones "may operate satisfactorily" outside of Andrea's stated preferred ranges. (Col. 14, lines 30-39) Andrea then states that "However, as the values of the angles ... become substantially different from the respective preferred values, the performance may be adversely affected." Andrea then notes that the performance may be so adversely affected that "a portion of even all of the speech may be canceled." (Col. 14, lines 49-64, and lines 30-48). In other words, Andrea mentions that the performance of the noise-canceling microphones can indeed be so adversely affected that speech may be canceled, i.e. that the two microphones no longer operate satisfactorily.

Such deleterious effects of the angles being substantially outside of the stated preferred range by Andrea precisely runs counter to the claimed invention in which the claimed controller, in response to the position estimation circuit producing an error signal representing an estimate of the microphones being mispositioned, compensates for the mispositioning.

The Examiner concludes that it would have been obvious to incorporate the two noise canceling microphone inputs of Andrea into the apparatus of Carlson, the motivation being that such dual microphone inputs would have been able to cancel noise from the input signal while still including the capability of inputting all directionalities of

sound from the environment. However, as noted, Andrea's noise canceling microphone inputs relies on the fact that both microphones are positioned for purposes of noise cancellation. For example, Andrea notes that such arrangement of the microphones ensures that "the first microphone 12 receives both the speech from the operator and the background acoustic noise which is present in the vicinity, and the second microphone 14 essentially receives *only* the same background acoustic noise which is received by the first microphone." (Col. 14, lines 23-29, emphasis added). Andrea further states that where the angle between the microphones is substantially outside of the stated preferred angle, the second microphone 14 would receive both the speech and background noise and thus *adversely* affect performance. (Col. 14, lines 30-39).

In contrast, the apparatus of Carlson provides audio feedback to facilitate the user in determining whether the user's mouth is too far or too close to the single input microphone and/or whether the user is speaking too loudly or too softly. Even if the noise canceling microphones of Andrea can be incorporated into the apparatus of Carlson, such noise canceling microphones can only be effectively utilized for noise cancellation when *both* microphones are positioned for noise cancellation purposes relative to the acoustic source. In other words, the noise canceling microphones of Andrea could only be used by Carlson separately and distinctly, i.e., mutually exclusively, from the use of the single microphone of Carlson in determining whether that single microphone is correctly positioned.

Thus, even if the two noise canceling microphones of Andrea were incorporated into the apparatus of Carlson, such combination would not read on the position estimation circuit producing the error signal (representing the estimate of the device being mis-positioned) produced from the audio signals from the first *and* second microphones as generally recited in the claims.

It is further noted that while Andrea allows the microphones to operate in a talk-thru mode rather than the noise canceling mode, as noted by the Examiner, such talk-thru mode actually <u>disables one of the microphones such that only **one** microphone provides the overall input for the system</u>. Such a talk-thru mode thus allows sound sources other than those included in the noise canceling response area to be provided to the output of

the system. (Col. 32, lines 55-56). Thus the talk-thru mode of Andrea, either alone or in combination with Carlson, would not read on the elements as generally recited in the claims in which both microphones receive and transduce acoustic signals into audio signals, the position estimation circuit using the audio signals from **both microphones** to generate the error signal, and the first circuit of the position estimation circuit providing an average of the audio signals received from both microphones to produce the error signal, much less a controller using the error signal to compensate for the mis-positioning by providing the audio signals from the first and/or second microphones to the output. In other words, whether the microphones of Andrea are operating in noise canceling mode or the talk-thru mode, the combination of Carlson and Andrea do not read on the elements of the claims as the Examiner contends.

The Examiner further relies on Ruegg as reading on the position estimation circuit being adapted to produce the error signal from audio signals generated by the first and second microphones as well as a controller that uses the error signal to compensate for the acoustic pick-up being mis-positioned by providing the audio signals from the first and/or second microphones to the output.

However, although Ruegg's hearing aid contains two microphones 11 and 12, Ruegg alternately utilizes only one of the two microphones at any given time. In particular, the reversing switch 23 couples *either* the output signal 13 from the omnidirectional microphone 11 *or* the output signal 14 from the directional microphone 12 to the amplifier 19. Thus, the second output 24 of the amplifier 19 is generated based on the signal from *one*, not both, of the microphones 11 and 12. The second output 24 controls the switch element 25 which in turn controls which output signal 13 or 14 to which the reversing switch 23 is coupled. (FIG. 2 and col. 3, lines 14-40).

The second output 24 of the amplifier 19 indicates whether the microphone signal coupled to the amplifier 19 exceeds a predetermined signal peak. If so, the switching element 25 supplies a control input 26 to the reversing switch 23 that causes the reversing switch 23 to be coupled to the directional microphone 12. The hearing aid may switch back to the omnidirectional microphone 11 either manually or automatically upon

absence of a signal at the amplifier output 24, i.e., upon absence of acoustic signal output from the omnidirectional microphone 11.

In other words, if the signals switched by the reversing switch 23 exceeds the predetermined threshold, the directional microphone is coupled (or remains coupled) to the amplifier 19 and the omnidirectional microphone is uncoupled from the amplifier 19.

As is evident, Ruegg fails to disclose or suggest a position estimation circuit that produces the error signal from audio signals generated by the first *and* second microphones.

Furthermore, the control signal generated by Ruegg estimates whether the user is in a conversation with another person or in a general background of sounds, such as being in traffic, and is *not an error signal* that estimates the device being mis-positioned. As such, the switching between the omnidirectional and directional microphones is not performed to compensate for the hearing aid being mis-positioned. Thus, Ruegg also fails to or suggest a controller that uses the error signal to compensate for the acoustic pick-up being mis-positioned by providing the audio signals from the first and/or second microphones to the output.

There is also a lack of motivation to incorporate Ruegg's directionality switching circuitry into the combination of Carlson and Andrea. Ruegg's directionality switching circuitry requires the selection of *either* the directional microphone *or* the omnidirectional microphone. In contrast, the noise canceling microphones of Andrea requires that *both* microphones be active so as to perform noise cancellation. Furthermore, even if Ruegg's directionality switching circuitry were added to the combination of Carlson and Andrea, the resulting apparatus would not read on the inventions as claimed. In particular, the combination of Carlson, Andrea and Ruegg would include a first microphone, the signals from which are used to determine whether the microphone is too far/close and/or whether the user is speaking too loudly/softly to thereby provide audio feedback to the user (Carlson) and, *only after* it is determined that the first microphone is correctly positioned, a second microphone that can *either* be used in conjunction with the first microphone for noise cancellation (Andrea) OR used alternately with the first microphone (Ruegg) (i.e.,

Withdrawal of the rejection of independent claims 1, 19, 22, and 28 as well as claims 2-10, 13-15, 20, 21, 23-25, 27, 29, and 33 dependent variously therefrom, under 35 U.S.C. §103(a) is respectfully requested.

Rejection of Claims 11, 12, 16-18, 26, and 30-32 Under 35 U.S.C. §103

Claims 11, 12, 16-18, 26, and 30-32 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson in view of Andrea and Ruegg and further in view of Hou.

However, the addition of the additional secondary reference Hou does not make up for the deficiencies of Carlson in view of Andrea and Ruegg as discussed above. Thus, claims 11, 12, 16-18, 26, and 30-32 are also believed to be allowable for at least similar reasons as those discussed above. Withdrawal of the rejection of claims 11, 12, 16-18, 26, and 30-32 under 35 U.S.C. §103(a) is respectfully requested.

CONCLUSION

Applicants believe that all pending claims are allowable and respectfully request a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

In the unlikely event that the transmittal letter accompanying this document is separated from this document and the Patent Office determines that an Extension of Time under 37 CFR 1.136 and/or any other relief is required, Applicant hereby petitions for any required relief including Extensions of Time and/or any other relief and authorizes

the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 50-2315 (Order No. 01-4962).

Respectfully submitted,

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